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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/511,422

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Michael Kempe

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EXAMINER

CARTER, MICHAEL W

ART UNIT

PAPER NUMBER

2828

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/511,422

**Applicant(s)**

KEMPE ET AL.

**Examiner**

MICHAEL CARTER

**Art Unit**

2828

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 02 September 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 10-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 10-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-946)
- 3) ☐ Information Disclosure Statement(s) (PTO/CDC)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_
- Paper No(s)/Mail Date \_\_\_\_\_

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. **Claims 10 and 19-20** are rejected under 35 U.S.C. 103(a) as being unpatentable over Payne et al. US Patent 4,39,898 (hereinafter referred to as Payne) in view of Yasui et al. US Patent 4,942,588 (hereinafter referred to as Yasui) and further in view of Ohishi et al. US Patent 6,373,863 (hereinafter referred to as Ohishi).
3. **For claim 10 and 19-20**, Payne teaches a resonator which is limited by an end mirror (figure 1, M1) and an output mirror (figure 1, label M2) and in which a fiber (figure 1, label 1) is arranged that comprises an active core (figure 1, doped fiber) and can be stimulated by pump radiation (figure 1, label 6) to have multi-mode laser activity such that a plurality of transverse modes occur in the resonator (column 2, lines 59-61).
4. Payne does not explicitly teach mode mixing occurs in the active core.
5. However, Payne does teach using a multimode fiber for the doped fiber. Mode mixing is inherent in all but a perfect multimode fiber. Any slight bend will introduce mode mixing. See, for example, Kutz et al., "Mode Mixing and Power Diffusion in Multimode Optical Fibers," *Journal of Light wave Technology*, vol. 16, page 1195 2<sup>nd</sup> column. In the examples of Payne, the fibers have bends and curves (figures 1 and 2) and therefore will exhibit mode mixing in the active core.
6. Payne does not teach the output mirror having an inner region and an outer region, wherein the output mirror has reflective properties for laser and pump radiation

varying between the outer region and inner region such that the outer region of the output mirror reflects essentially all pump radiation as well as essentially all laser radiation, and such that the inner region reflects essentially all pump radiation, but said inner region being of lower reflectance for the laser radiation enabling laser radiation to be transmitted there through, whereby said output mirror predominantly couples out low transverse modes.

7. However, Yasui does teach using an output mirror (figure 10a, labels 1, 12, and 61) having an inner region (portion of label 12 not covered by 61) and an outer region (label 61), wherein the output mirror has reflective properties for laser and pump radiation varying between the outer region and inner region such that the outer region of the output mirror reflects essentially all laser radiation (column 6, lines 54), and such that said inner region being of lower reflectance for the laser radiation enabling laser radiation to be transmitted there through (column 6, lines 53-54), whereby said output mirror predominantly couples out low transverse modes (column 6, lines 45-48) in order to produce a nearly Gaussian high quality beam and still maintain a high oscillating efficiency.

8. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the coupling mirror of Yasui with the fiber laser of Payne in order to produce a nearly Gaussian high quality beam and still maintain a high oscillating efficiency.

9. The above combination does not teach the output mirror has reflective properties for pump such that the outer region of the output mirror reflects essentially all pump radiation and such that the inner region reflects essentially all pump radiation.

10. However, Ohishi does teach using an output mirror with a high reflectivity at the pump wave length (figure 15, label 54 and column 13, lines 39-42).

11. It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to combine high reflectivity at the pump wave length taught by Ohishi with the previous combination in order to provide a second pass of the pump light to further excite the active medium.

12. **For claims 11 and 21-22**, it is well known in the art to layout the fiber in loops (which include bends) in order to form a compact structure. See for example Burns et al. US PG Pub 2003/0063848, paragraph 37. It therefore would have been obvious to one of ordinary skill in the art at the time the invention was made to layout the fiber in loops. The loops and bends then promote mode mixing as discussed in the rejection of claim 10 and 20 above

13. **For claim 12**, Ohishi further teaches the fiber active core has a D-shaped cross section (figure 12, label 16) in order to create two regions, one with  $\text{Yb}^{3+}$  and the other with  $\text{Pr}^{3+}$ , which share a common light conducting path (column 11, lines 59-63).

14. It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to use Chichi's D-shaped cross section with the previous combination in order to create two regions which share a common light path.

15. **For claim 13**, Payne teaches the output mirror is exchangeable (figure 1, label 5). That is, there is nothing which would prevent one of ordinary skill in the art from exchanging it out. The limitation "thereby providing for switching a wavelength of the laser or a diameter of a laser beam emitted from the laser" recites an intended use and has therefore not been given patentable wait.

16. **For claims 14 and 23**, Payne teaches an exchangeable mirror as discussed in claim 13 above, and Yasui teaches an inner and outer zone as discussed in claim 10 above.

17. **For claim 15**, Yasui and Ohishi teach the outer zone reflects laser radiation and pump radiation and said inner zone has a lower reflectivity for laser radiation than the outer zone as discussed for claim 10 above.

18. **For claims 16 and 24**, Yasui further teaches the inner zone is not necessarily coaxial to the radiation exiting from the active core (figures 11 and 12) in order to output multiple beams.

19. **For claim 17 and 25**, Yasui further teaches the inner zone is generally circular (figures 10a-12, holes in 61), having a smaller diameter (holes in 61) than the active core (label 3).

20. **For claim 18 and 26**, Payne further teaches beam expanding optics arranged between an end of the fiber and the output mirror (figure 1, label 3).

***Response to Arguments***

21. Applicant's arguments with respect to claims 10, 19, and 20 have been considered but are moot in view of the new ground(s) of rejection. New grounds of rejection were necessitated by the amended claims submitted 9/2/2008.

***Conclusion***

22. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

23. A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

24. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **MICHAEL CARTER** whose telephone number is (571)270-1872. The examiner can normally be reached on Monday-Friday, 7:00 a.m.-4:30 p.m., EST.

25. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on (571) 272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

26. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/MC/

/Minsun Harvey/

Supervisory Patent Examiner, Art Unit 2828